

CHAPTER VI

CONCLUSIONS AND SUGGESTIONS

6.1 Conclusions

1) The chemical and physical property of oil changed after frying. The color of used oil became 56 darker folds and viscosity and unsaturated fatty acid increased 10 % and 4 % than refined palm oil, respectively.

2) Naphthalene and benzo[a]pyrene was detected and identified in used frying oil by HPLC and GC-MS analysis. When used frying oil was utilized for biodiesel production catalyzed by immobilized lipase, Lipozyme RM IM and Novozym 435 were adsorbed by naphthalene and benzo[a]pyrene. The presence of naphthalene and benzo[a]pyrene decreased hydrolytic activity of Lipozyme RM IM and Novozym 435 by 77-80 % and 54-82 %, respectively.

3) The optimum production condition using 20 % (w/v) Lipozyme RM IM were as follow: 1:4 molar ratio of frying palm oil to methanol with continuous-flow methanolysis at 60°C without water after 24 hours reaction. On the other hand, the optimum production condition using 20% (w/v) Novozyme 435 was as followed: 1:3 molar ratio of used frying palm oil to methanol with continuous-flow methanolysis at 60°C after 24 hours reaction time.

6.2 Suggestions

The amount of used frying oil was the important problem in this recent year. Moreover, xenobiotic substance such as PAHs accumulated in used frying oil. PAHs in used frying oil affect the human health for example neurotoxicity, DNA replication and mutation. When used frying oil was exposed to the environment, PAHs accumulated in the environment. Thus, the knowledge about the management of the used frying oil and the proper management of used frying oil were necessary. Utilization of used frying palm oil as the biodiesel production was the alternative method for management of used frying oil.

The biodiesel from used frying oil could be several advantageous possibilities. For example, biodiesel can reduce tailpipe particulate matter (PM), hydrocarbon (HC), carbon monoxide (CO) and carbon dioxide (CO₂) emissions from most modern four-stroke engines, which is the global warming gas. Moreover, water quality will be improved because the increased market value of improper disposal into sewers, storm drains and waterways, reducing watershed and storm runoff pollution. On the other hand, enzymatic transesterification reduced the chemical in the biodiesel process, which waste water treatment is not necessary in the processes. Therefore, utilization of used frying palm oil is expected to be in effect in the coming year in Thailand.